

THE
ANNUAL REPORT

OF THE

CANAL COMMISSIONERS

OF THE

STATE OF NEW-YORK,

Presented to the Legislature, the 27th February, 1822.

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REPORT, &c.

To the Legislature of the State of New-York, pursuant to the act, entitled "an act respecting navigable communications between the great western and northern Lakes, and the Atlantic Ocean," passed April 15th, 1817, the Canal Commissioners most respectfully report :

In relation to the Western Section of the Erie Canal—

That early in the last season they had a proposition, from good men, to construct a stone culvert, for the Irondequot creek, and make the necessary embankments of earth at that place, upon terms so much more advantageous to the state than any before offered, that they concluded to accept it. Towards the construction of the wooden aqueduct across the valley of this creek, much of the necessary timber and plank had been procured prior to our acceptance of the proposition aforesaid ; but in the proposition, all that, was taken off our hands, without loss ; and all the labor laid out in execution of our first contract, applied equally well to the execution of the last, except the procuring and driving of a few piles. The lowest proposition for embankment, at the place in question, formerly made, was at twenty-five cents per cubic yard ; the proposition accepted last spring, for the same embankment, was

at fourteen cents per cubic yard; and, besides the effect produced on our minds, by the important difference in the amount of the two propositions, we were induced to resort to permanent works, of stone and earth, instead of the wooden aqueduct embraced by our first contract, by the fear that the winds might have an unfavorable effect upon the latter, narrow as it would be, and raised, for a considerable part of its length, more than sixty feet above the surface of the ground.

The persons who were the original contractors, for the section containing the works above alluded to, are still engaged to complete it, with the late modifications, and they have exerted themselves with much diligence. The culvert for passing the creek under the canal, was completed in October last. It is a structure of very substantial masonry, founded on piles, and consisting of a semi-circular arch, twenty-six feet in diameter, and extending under the embankment, at right angles with the line of it, two hundred and forty-five feet. In preparing the foundation of this culvert, great difficulty was presented by quicksand. More than nine hundred piles, about a foot in diameter, and from twelve to twenty feet long, were driven, for the purpose of sustaining permanently the enormous weight of the stone arch above described, with the embankment resting upon it, and rising forty feet above its crown. The embankment is now nearly brought up to the bottom of the canal; and had it not been for some delay in the completion of the culvert, occa-

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sioned chiefly by the quicksand, in its foundation, it would probably have been raised to that height by the twenty-fifth of December last ; for it has been constantly carried on, in the most judicious, systematic, economical, and persevering manner, with all the means that could be employed beneficially within the limits of the works.

The great mass of the embankment will consist of sand and gravel, which the contract provides, to have raised as high as the bottom of the canal, by the time above mentioned. It was thought prudent, in so high an embankment, to have the earth nearly all thrown up, as soon as possible, and then left to be compacted by the thaws, rains, and floods of the spring, before it should be completed. It is intended still to pursue this course ; and after the earth shall have suitably settled, the bottom and sides of the canal, through the embankment, are to be sufficiently lined with good clay, well puddled, before the water is admitted. The labors bestowed upon this very interesting section have been faithful, and hitherto promise all the requisite results.

One of our most pressing and important duties, at the commencement of the last season, was to locate the canal line through the Cayuga marshes, and place it in proper hands for construction. Before the waters had subsided from these marshes and the neighboring swamps, we had several levels taken and lines run, through this section of country. The labors necessary here, though unusually fatiguing and unpleasant, were undertaken with alacrity, by

our engineer and his assistants; and after several days strenuous exertion, in water from six inches to a foot in depth, the line was satisfactorily established.

The precise distance across the marsh had never been measured; and it was supposed that the canal might be so laid, as not to make its length from Montezuma to Clyde, more than about nine miles. The route actually adopted, however, was over eleven; and it was the shortest that could be found, uniting economy and safety. This length is broken into two distinct levels, by a lock of eleven feet lift, so placed as to make the Seneca river level about six and a half miles long, and the Clyde level a little more than four and a half.

The last of these levels was laid, for the most part, over hard lands, and offered no considerable impediments to the construction of the canal. But the Seneca river level, was always regarded with much solicitude, for several reasons. It cannot be drained at all; the excavation is from five, to nearly eight feet deep: and it was doubted, whether the earth had such a consistence, as to admit of its being excavated by any ordinary process, or so as to keep its place in the banks, after the excavation should be effected. The whole level is, besides, subject to be overflowed by the waters of the Seneca river, and the Canandaigua outlet, to the depth of three or four feet, and is actually overflowed for a considerable part of every year.

The quality of the earth, in the open marsh, is

found to be, to the depth of four and a half feet, black and light vegetable matter, underlaid to below the bottom of the canal, with shell marl. And in the swamps, with considerable muck and marl, there is much clay and sand, mixed in various proportions.

Both of these levels were staked out and divided into suitable sections, preparatory to their being contracted for, before the seventh of May last; when they were let out, to be completed by the fifteenth of the next October. It was hoped, that the whole distance, including the lock, might be opened in the course of four or five months; though, situated as the lower level is, it was always known, that much must depend upon circumstances of uncontrollable contingency. Most of the Clyde level is completed, and that part of it which is not, requires but little more than trimming and dressing off the banks. The lock pit is excavated, the foundation of the lock laid, and three courses of stone work raised: and the other materials are nearly all delivered, and prepared for use; so that, in about three weeks, next spring, that work may be finished.

But there is much to be done yet, upon the Seneca river level. In the marsh and swamps, the state of the waters was such, as not to admit of attempting to excavate them, till the latter part of May: and soon after the laborers had began to work, a flood came over the whole line, which drove them off for three weeks. It was not, therefore, till after the middle of June, that much labor could be applied

to this level. At that time, the work was re-commenced with spirit; and it was carried on, thenceforward, with success, and increasing means, till near the first of August, when sickness began to manifest itself among the hands. For two months, when the waters were lowest, no efforts could keep up the necessary number of workmen. In this time, the number actually engaged, varied from two hundred to seven hundred; all the principal contractors, with many of the sub-contractors and hands, became diseased; and as there was daily a considerable change of men, those who had acquired, from experience, the skill necessary to enable them to apply their labors judiciously, being obliged to give place to new hands, the progress of the work was much retarded.

After the commencement of our operations here, it was soon ascertained to our entire conviction, that our plan of making the canal was practicable, and that the earth was of such a sort, in general, as to make good banks. But our hope of finishing it within the season, depended upon a long continuance of dry weather after the frosts should commence. With this we were not favored. On the contrary, from the twenty-fifth of August, till the end of the fall, the rains were uncommonly frequent. Several times they were sufficiently copious to swell the streams above our work, and drive us off; and when they were not, they kept the earth almost constantly muddy, heavy, and slippery, inso-much that every exertion was made to great disad-

vantage Still, in spite of these difficulties and afflictions, the Seneca river level was more than half done on the first of December last ; and since that time the contractors have not remitted their labors. The severe frosts of December, by congealing the water, gave them a new impulse ; and there is now about three hundred men profitably employed on that level. Before the first of May, we hope to have a passage for boats, opened though it ; and within two months afterwards, if the spring floods are not of uncommon duration, we calculate to have it wholly completed.

As soon as the season would permit our engineers to pass through the country, from the brow of the mountain ridge in Niagara county, and the Tonnewanta creek, they commenced operations there ; and on the twenty-first of May, contracts were entered into for that portion of the canal. Through that ridge, occurs the most extensive deep cutting, which we have any where to encounter. It is, in truth, very formidable, and exceeds seven miles in length.—The end of it, nearest the Genesee river, is intended to be connected with the level extending across that river, by five pair of combined locks, which, in the aggregate, are to have a lift of sixty feet. From the uppermost of these locks, at which the excavation is to be about thirteen feet deep, the ground rises, as the line extends southerly, for a mile and a half, where the excavation is required to be thirty feet and six inches deep. From this point, the ground gradually falls to the Tonnewanta creek, where the

excavation will be about twelve feet deep, except that in the south half of this deep cutting, considerable advantage will be derived from the channel of a brook.

It is ascertained, by minute examination, that at the bottom of the canal, from the locks southerly, the excavation for about three miles, must be through limestone rock; and, for about two miles of this distance, the rock rises to within from two, to six feet of the surface. The rock is in irregular layers, of unequal thickness, and is to be broken up, partly by blasting, and partly by the use of bars and wedges.

The depth of digging above stated, will be sufficient to give the canal, at all times, from the waters of lake Erie, when they are lowest, a depth of four feet. When the contracts were taken through the mountain ridge, provision was not made to go so deep as to obtain the supply of water from lake Erie: Appearances, the fall before, seemed to justify the expectation, that the Tonnewanta creek, Ellicott's creek, Skejaqueta's creek, and Buffalo creek, would afford an adequate supply of water, and they might all be conducted into a level, which would place the bottom of the canal as high as the surface of lake Erie. It was evident that such an arrangement of the level would save much expense in excavation through the ridge; and if the water relied upon, should fail to fill it, no loss would be sustained by resorting at last to greater depth of excavation, because the location of the line ought to be the same in both cases; and all that should be

done towards the completion of the canal upon the highest level, would well apply to its completion upon the lowest level. After much pains, however, to gauge the streams during the last autumn, we determined to adopt the lowest level, and to construct the canal, in the first place, so as to receive its supply of water from the lake.

As the line is carried much of the way in this deep cutting, through swamps, which it would be impossible to drain otherwise than at each end of it, after mature deliberation the whole seven miles was divided into four sections, and let out in four separate contracts. The two sections commanding the drains at each end, are required to be excavated one season before the other two sections. And it is specially stipulated, that the latter shall have the privilege at all times, of draining through the former. The first section contains half a mile of excavation, and as it runs all the way through rock of a quality supposed to be suitable for the locks, they are included in it. The second section is one mile and thirty-five chains in length, comprising the greatest depth of excavation, and being mostly rock. The third section is two and a half miles long, and consists of some rock, but chiefly of earth. The fourth section is nearly two miles and three quarters long, consisting of earth exclusively.

In almost all cases, the locks of a canal should be separated by spaces, or pound reaches, of at least forty rods in length, in order to save water, and to prevent injurious delays in the passage of boats. At

the brow of the mountain ridge, from the almost perpendicular descent of the whole sixty feet, such a separation would be impracticable, without enormous expense. The plan of combined locks was, therefore, adopted from motives of economy; and to prevent delay, it was determined to construct two set, one for ascending, and one for descending boats, both set being found, by calculation, much cheaper than one set with the necessary separation. The most powerful argument against combined locks, in ordinary circumstances, the saving of water, does not all apply here, for lake Erie is an inexhaustible fountain; and we are under the necessity of supplying the long and dry level between the ridge and Genesee river, with water from above the locks. It is believed, that the supply of that level will require more water than will commonly pass through the two sets of locks; and for the purpose of passing an additional quantity, it is contemplated to construct a waste wier at that place.

When the ridge sections were contracted for, their entire extent, except a small part of the line at the northern extremity, lay through an unsettled wilderness, very heavily timbered, and much of it under water. It was not, therefore, without great difficulty, at first, that the contractors erected their houses for shelter, opened roads for the delivery of their provisions and tools, and collected their hands. Still they went on with resolution, increasing their means as they supposed they could apply them most advantageously: And although from the diffi-

culties attending their commencement, and the long course of unfavorable weather in the fall, they have not performed so much as we hoped they would, they are continuing the application of their labor through the winter, and promise a great increase of hands in the spring. Their grubbing and clearing is nearly all done, and they have excavated about fifteen thousand cubic yards of rock, and probably seventy thousand of earth. The latest of these contracts expire the first of September eighteen hundred and twenty-three; and probably the sinking of the canal line below them, may be effected within one year from that time.

On the sixth of June, proposals were received, and contracts signed, for opening a feeder from the Genesee river into the canal; for constructing a stone aqueduct across that stream; and for carrying the canal from the termination of our former contracts, on the east side of the river, westerly through the village of Rochester. The feeder is about two miles long, and laid on the east side of the river. It will be twenty-six feet wide on its surface, and three feet deep. The water is conducted into it by a dam across the river, placed a little below the head of a rapid, and which is eighteen inches high, and six hundred feet in length. The dam consists of two courses of timber, stretched across the river parallel with each other, at the distance of ten feet apart, and strongly bolted to a bottom of rock. The space between the two courses of timber is then filled in with gravel, which is secured from washing away,

by a close covering of three inch plank. This dam is finished. Near the head of the feeder is a guard lock, to prevent the dangerous intrusion of floods.— And after these works are completed, which they probably will be in May next, it is expected that, with a little additional expense, a good navigation, forty miles up the river, will be opened from the canal.

The aqueduct will be of solid mason work, above five hundred feet long, and to consist of nine arches, of fifty feet span each, connected together with the necessary abutments and piers. The place of crossing the river is exceedingly well adapted to such an edifice; for the water is in very rapid current both above and below, and the foundation is rock. Much labor had been expended in preparing the foundation; in building a culvert required near the east end of the aqueduct; and in quarrying, delivering, and cutting the stone for the work, by William Brittin, an ingenious and enterprising man, who was engaged in its construction, when, about the middle of December last, he died. After this event, no time was lost in placing this heavy and very important job into other hands, which are now busily engaged in procuring and preparing the necessary materials, under a contract to have it completed by the first of September next.

Twenty miles of the canal line, west of the Genesee river, were let out the tenth of July, to be made ready for navigation by the time above mentioned for finishing the Genesee aqueduct. And on the fif-

teenth and seventeenth days of October, about forty five miles more, including the whole distance from the last letting to the mountain ridge, except one easy section about twenty chains long, were undertaken to be completed by the first of July eighteen hundred and twenty-three.

During the last season more than eighty miles of the great western section of the canal have been let out; and, with the small exception specified above, the whole of that section is either completed, or now in the charge of contractors, between the Seneca river and Tonnewanta creek, which are more than one hundred and thirty miles apart. Contracts have been taken much lower than at any preceding period. And although the intrinsic difficulty of our operations, at the Cayuga marshes, the Irondequot creek, and the mountain ridge, together with the unfavorable weather of the fall, have prevented us from accomplishing all that we hoped, we have still made great progress, and have satisfied ourselves by experience, both that the canal is practicable at all these difficult places, and that it will not cost, in the aggregate, more than the original estimates.

By carefully exploring every place offering a probability of shortening the canal line, without subjecting us to disadvantages more than sufficient to counterbalance all the benefits of curtailment, our engineers have had the good fortune to find a route from the Genesee river to Buffalo creek, by which the distance between these places will be diminished about six miles, when compared with the original survey of eighteen hundred and sixteen.

Between the Seneca and Genesee rivers, the following parts of the canal are now completed, viz :

More than fifty miles of the line, of which about twenty-eight have been actually navigated :

Eleven locks of stone, cut and laid in the best manner, in water proof lime mortar. The five other locks included in this distance, will be finished in two or three weeks, as soon as the weather becomes suitable for mason work :

Thirty-one arched stone culverts, of various sizes, and one culvert of wood, sunk so as to be always under water :

Two large aqueducts across Mud creek, of which one is made of stone abutments and piers, with a wooden trunk upwards of one hundred feet long ; and the other consists of three stone arches, of thirty feet span each, with proper abutments and piers to support them, and a trunk of well cut and jointed stone work, to contain the waters of the canal :

Three waste wiers, having the aggregate length of two hundred feet :

Forty-five road bridges, and about half as many farm bridges.

It is probable that a connected navigation from Montezuma westward, for fifty miles, may be enjoyed in the month of May next, to the Irondequot embankment ; and we calculate to have that great work passable in the course of the ensuing July ; long before which, all the residue of the canal will be open to the Genesee river.

From the point where the canal line intersects the Tonnewanta creek, to the mouth of that stream, and thence up the Niagara river to Buffalo creek, our engineers have again carried their level and examinations, and reported the result to us. It is believed that no very important obstacles will impede the construction of the canal through this region, and the commissioners are confirmed in their former opinion of the propriety of terminating the canal at Buffalo creek.

The canal commissioners have decided a variety of cases, in which damages were claimed for injuries supposed to be done by the western section of the canal, in passing through the lands and waters of individuals; and they have taken an account of the grounds of claim in numerous other cases not yet decided, because the amount of damages, if any, could not hitherto be judiciously adjusted. In one case, where damages have been given, the lawful appeal has been made to the supreme court. The amount of damages appraised and certified in this case, was two hundred dollars. The appeal was sustained by a large number of affidavits, of various persons, in which the deponents (who are neighbors to the appellant, but who have no lands through which the canal passes.) state their estimate of the amount of damages sustained by the appellant, at various sums, from five hundred dollars, up to twelve hundred and fifty. A copy of the proceedings in this appeal, having been furnished the canal commissioners, who appraised the damages; after advisement

with the Attorney General, by direction of the board, they made affidavit of the general grounds of their appraisal, and had the same presented to the court. The court set aside the appraisal, as unjust and inequitable.

In relation to the Middle Section.

This section has been navigable during the whole of the last season, with the exception of a few days, which were employed in making repairs and which interrupted the navigation for a part of the time only.

The tolls which were collected during the same period, including those received at the Little Falls, and on the old canal at Rome, amount to the sum of twenty three thousand one dollar and sixty-three cents.

This amount has been principally derived from the following articles which have passed upon the canal the last year, to wit: 44,723 barrels flour, 17,068 do. salt, 5,543 do. provisions, 4,472 do. pot and pearl ashes, 153 do. oil, 43,078 bushels of wheat, 1,061,844 feet of boards, 71,000 bushels of lime, 67,273 gallons of whiskey, 45,162 posts and rails, 772 tons of gypsum, 48,981 feet of timber, 2,500 tons of merchandise, 63 tons of household goods, 58 tons of butter and lard, 2,481 boxes of glass, 923 m. shingles, 47,764 oak staves, 2,761 hoop-poles, 3,000 staves, 9,993 pounds maple sugar, 1,736 do. geese feathers, 8,100 do. rags, 5,850 do. cheese, 100 reams of paper, 406 pounds bees wax, 4,238 do. of wool, 14,000 brick, 3,600 pounds of hops, 8,200 bushels of grain, 47 wagons and 10 coaches, besides a variety of articles of

less importance. The number of boats which have passed the collector's office at Rome amounts to 2,731.

The amount of property which passed up on the canal, was much diminished, in consequence of the difficulty and expense which attended the transportation of it from the canal to the Hudson. But this difficulty will be in some measure obviated the ensuing season, by the extension of canal navigation, and the connection of it with the navigation of the Mohawk; and we are encouraged to believe, that the receipts of toll will be more than doubled the present year.

In relation to the Eastern Section.

The operations on this part of the canal have been greatly extended, and the work has been prosecuted with undiminished success. In the course of the last season, contracts have been entered into for its entire completion to the navigable waters of the Hudson; and that part of the line which was under contract previous to the last annual report, has been so far completed, that boats have navigated it from Utica to the Little Falls. From the latter place to Schenectady, on all the contracts, a large proportion of the excavation and embankment has been accomplished—a great number of stone culverts, several aqueducts, and fifteen locks, including those at, and above the falls, have been built in the most substantial manner.

Several dams on the principal streams which cross the canal line, have been constructed, and the very

important one at the Schoharie creek, has been commenced, and put in such a state of forwardness, as to ensure its completion the ensuing season.— The most difficult and tedious operations along the line were begun the last season, with a view to their being finished at as early a period as was practicable; and it is now confidently believed, that the whole of this section, as far east as Schenectady, will be rendered navigable before the close of the present year. For the accommodation of the public the ensuing season, a wooden lock has been constructed, at a small expense, at the German Flatts, which connects the Erie canal with the navigable waters of the Mohawk, and forms an uninterrupted boat navigation from Schenectady to the Cayuga and Seneca lakes, and which will be extended by the further completion of the western section, before the middle of summer, to the Genesee river at Rochester.

From Schenectady to the Hudson, on account of the lateness of the season when this part of the line was located, but little labor has been done; there has been, however, since the commencement of sleighing, a great number of teams employed in transporting stone to this, as well as other parts of the canal, to be used in the construction of locks, aqueducts, and culverts; and the quantity which will be delivered the present year for these purposes, is estimated at 200,000 tons.

The termination of the eastern section of the Erie canal, and its connection with the navigable waters

of the Hudson, has been with the canal commissioners, as with the public, a subject of much solicitude; and the acting commissioner on this section, at an early period, as well as subsequently, directed the engineers to explore eastwardly of the Little Falls, various routes, with a view of obtaining the best practicable line to the Hudson. Pursuant to these directions, Mr. Wright, the principal engineer, and Mr. White, acting engineer, have repeatedly traversed the country within the range of the proposed routes, taking such levels and making such surveys as were necessary, and examining particularly every valley or ravine which afforded the probability of a passage from the valley of the Mohawk. All these examinations have however proved fruitless, and the engineers have uniformly reported, that the high grounds which lie to the south of the Mohawk, could not be passed without encountering a great extent of deep cutting, or of tunnelling, or by another measure attended with much difficulty, that of taking a high and long level, which, commencing west of the Schoharie creek, and rising above the Mohawk, would pass the high ground east of Schenectady. On this plan, the only feeder which could be commanded, must be introduced into the western end of this long level, and would afford but a scanty supply, to replace the absorption and leakage of the canal, and the continual discharge of water by two sets of locks, which will soon be required, to facilitate an immense number of boats in their passage to and from the Hudson.

They have furthermore reported, that the saving in distance would be little or nothing, unless a direct route through the hills from Schenectady to Albany could be taken, a measure which, from their examinations, they deem to be altogether impracticable. The distance from Schoharie creek, on the canal line, as now located, to the point of its intersection with the Hudson opposite to the city of Troy, is 43 1-2 miles, and is nearly, if not precisely, the same distance that it is from the said creek to the city of Albany, on a route which some persons have lately considered practicable, and which is nearly the same route as was suggested by the canal commissioners in their report of 1817, and which, on an examination subsequently made by the engineer, was abandoned.

In consideration of these facts, and of the great expense and delay attending the construction of the canal on any other route, the canal commissioners have unanimously concurred in the opinion, that it was advisable to continue the canal along the valley of the Mohawk, until it approached the Cohoes Falls; from whence, bearing to the right, and gradually descending the high ground, it might take a direct course to the city of Albany, at which place, as well as at a point opposite the city of Troy, it ought to connect with the Hudson. This line, which has been surveyed by Mr. White, will receive the Schoharie creek as a feeder, it will also receive the waters of the Mohawk at Alexanders's mills, four miles below Schenectady, and at another point a short dis-

tance above the Cohoes. These feeders, together with some smaller ones, will at all times afford the canal, on this route, an abundant and equable supply of water.

In running the line from the Little Falls eastwardly, the engineer has availed himself of the favorable ground which the flats of the Mohawk afford; and by a judicious distribution of his locks, has dropped his various levels on land giving suitable depth of cutting, and requiring but little embankment; he has also taken care to keep his line, in all places above the floods of the river; and avoided, on the other hand, as far as was practicable, the sides of steep banks where the soil is liable to slip, and the canal to be otherwise injured by the torrents from the hills. The correctness of this location was tested by the great flood of November last, which, suddenly raising the Mohawk to an unusual height, was not observed any where to approach within many feet of the top of the banks, or to do any injury to the works which were completed. On the land side more damage was sustained; the flood from the hills filled the canal, and in some places broke down the new and unfinished banks, destroyed the wing of one of the dams, and injured several unfinished culverts.

The principal difficulties in the construction of this section occurs in the narrow passes along the Mohawk, where the hills, crowding to the waters edge, and terminating abruptly, render it necessary, in such situations, to construct the canal either entirely in the river, or partly in the river, and partly in the

hill; and in either case, the foundations must be laid at the bottom of the river, the work must be carried up above the highest floods, and the outer slope of this high embankment must be secured with a covering of stone, to prevent the earth from being worn away by the rapidity of the current. The magnitude of these embankments, the quantity of stone required to protect them, and the difficulty of excavation, which is not unfrequently of rock, renders these jobs the most expensive of all our undertakings. The most considerable obstacles of this sort, after passing the Little Falls, are found at Dievendorff hill, opposite Palatine, at Van Alstyne's, at the Nose, at Yankee hill, at several places between Amsterdam and Schenectady, and between Alexander's mills and the Cohoes.

From Alexander's mills, which are about four miles below Schenectady, to the Cohoes Falls, is the most difficult part of the whole line. For a great part of this distance, the bed of the river, which occupies a deep ravine worn out of rock, has a considerable declivity. The banks, in many places, consist of irregular bluffs, composed of grey wacke and argillaceous slate. Three months were spent by the engineer, in the fall of 1820, in examining and re-examining this part of the line. It was found necessary, in several places, and for considerable distances, to locate the canal in the bed of the stream, for the purpose of avoiding the insuperable difficulty, which was presented by the height of the steep and rocky banks. At one of these passes, it

was ascertained that the water has a descent of more than eight feet in half a mile, and by its course, is directed against the south bank, which, although composed of rock, bears strong marks of the violence of the stream. Here it appeared necessary to occupy a part of the bed of the river, and to construct and maintain a bank capable of resisting the force of its most impetuous floods.

Last spring, the engineer, Mr. White, re-examined and re-levelled the line. He made various attempts, by altering the location of the locks, to surmount this difficult and dangerous place, by a more elevated line. This, however, he found to be impracticable.

From the high grounds, on the south of the river, to which side all his examinations had as yet been confined, the country on the north bank appeared to him to present a more practicable route for the canal. He accordingly crossed the river, and after carefully examining, and carrying a line from a point opposite to Alexander's mills, to a point nearly opposite to Fonday's ferry, about four miles above the Cohoes, he became fully satisfied that it would be better to cross and re-cross the river at the places above mentioned, than to encounter the difficulties on the south bank. After the two nearest acting commissioners were apprised of this new location of the line, they directed Benjamin Wright, and James Geddes, Esqrs. the two senior engineers, carefully to survey the lines on both sides of the river, in company with Mr. White, and to report thereon. This survey resulted in the unanimous opinion of the

engineers, that it would be best to cross and re-cross the river. The two acting commissioners, above referred to, also examined both lines, with the same result; and this location of the line, has been unanimously confirmed by the board.

The following facts, it is presumed, will furnish conclusive reasons in favor of crossing the river. From a point, near Alexander's mills, on the south bank of the river, where the two lines separate, to a point near Fonday's ferry, on the same bank where they unite, the north route is found to be one and a half miles the shortest. There is much less excavation of rock, and one mile less of embankment in the river, on the north, than on the south route. The estimate of the expense, carefully made by the engineer, of constructing the canal, (independent of the locks, which are the same,) on both routes, is as follows, viz.

South route,	\$279,949 09
North route, including the two aqueducts,	204,178 18
Balance in favor of the north route,	<u>\$75,770 91</u>

Thus, on a comparison of the two, it appears in favor of the route on the north side of the river, that one and a half miles will for ever be saved in distance, and more than one fourth of the whole expense of construction. Moreover, the canal will be thrown on the north side of the ravine of the Mohawk, exposed to the rays of the sun, by which the ice will be dissolved, and the navigation opened some days earlier in the spring; and it is not believed, that the risk of maintaining the aqueducts,

will be greater than the hazard of sustaining the canal bank against the violence of the floods of the river in the dangerous pass above described.

Apprehensions are entertained by some, that the site of the aqueduct, near Alexander's mills, is not sufficiently elevated above the river. Should it appear, by the floods of the ensuing spring, or by further information than has yet been obtained, concerning the maximum height of the freshets, that this is the case, an additional elevation of several feet may yet be given to the plan of the aqueduct, so as to place it above any possible rise of the river.

The aqueducts are to be constructed with solid piers and abutments of stone masonry, laid in water lime, and clamped with iron. These will sustain a wooden trunk, containing the water of the canal. The wood will decay in about fifteen years; but the materials being previously prepared, the old trunk may always be replaced by a new one, during the winter, while the navigation is obstructed by ice. Besides, after the whole navigation shall be opened, and free access given by water to the iron mines of the north, indestructible trunks of cast iron may be made, composed of large plates, with flanges connected by nuts and screws, in the same manner as many of the modern aqueducts in England are constructed.

In reference to the Champlain Canal.

Since the last report, great progress has been made in the works on the Champlain Canal. The excavation of the cut at Fort Miller, which is to connect the navigation above, with the navigation be-

low the falls, has been completed. The guard gates at that place are made, and the locks nearly finished. The dam across the Hudson, at Saratoga Falls, and the guard gates at that place, have been finished. The aqueduct across Fish creek, and the culverts on the Saratoga level, have also been completed; so that the whole line, to a point about one mile south of the village of Stillwater, was ready in October for the reception of the water, except a piece of embankment at Van Veghten's creek, the completion of which had been delayed by the construction of a large culvert. The work at this embankment has been carried on this winter, and is now nearly finished.

The line from Stillwater, to within one and a half miles of the village of Waterford, was put under contract last spring, and most of the contracts have been finished, and the remainder are in great forwardness. From the place last mentioned, the letting was suspended until the line of the Erie canal could be definitely located, at the place where it was supposed the two would form a junction. The location of the line was made in September, and the remaining part of the Champlain canal was let to contractors. Contracts for the locks, culverts, and road bridges, between Stillwater and Waterford, have been made; and it is believed that three fourths of the stone for the above works, are already quarried, cut, and transported to the places where they are to be used.

In the summer of 1820, a meeting of the commissioners took place at Sandy Hill, for the purpose of

deliberating on the best mode of supplying the summit level of the canal with water from the Hudson. They personally examined the routes of several proposed feeders, particularly one from above Glen's Falls, one from Baker's Falls, and they also extended their examinations along the river below the latter place. Before they adjourned, they directed the engineer to take the levels, and make the necessary surveys of these several routes, and report the result at a future meeting of the board. At a subsequent meeting in the city of Albany, the report of the engineer was made; from which it appeared that, to conduct the water from above Glen's Falls to the summit level of the canal, a cutting of forty-five feet deep, must be encountered. This route was, of course, abandoned; and it was decided to construct a dam across the river of twenty-eight feet in height, about one and a half miles below Baker's Falls. A contract was made for the erection of this dam, and the work was nearly completed, when the sudden and unexpected flood of the 12th of November last, destroyed and swept away one hundred and eighty-five feet of the dam, the same being that part of the structure in which an aperture had been left to discharge the water of the river while the dam was building.

From examinations and levels made the present winter on the route, for a feeder first above mentioned, it is ascertained that an error was committed by the engineer, in taking the levels in 1820. Five engineers have been recently sent to examine this subject; and they all agree in opinion, that it is now

more advisable to take the water from Glen's Falls, where, but for the unfortunate mistake above mentioned, the feeder would have been originally located, than to repair the dam. In this opinion, the board concur; and every effort will be made to construct this feeder as early as possible.

When we reflect on the great variety and magnitude of the works which have already been successfully completed; the minute accuracy and mathematical exactness with which such works must be conducted in all their details, and the unparalleled rapidity of their execution, we could not reasonably have anticipated an entire exemption from mistakes, and it is a subject of congratulation, that not more have been committed, and that those which have occurred, have not been irremediable, and have not essentially compromised the interests of the public.

The toll collected on the canal amounts to \$1,386 84.

The following are the principal articles on which the toll was received, viz: 9,731,962 feet of sawed stuff, consisting of boards, plank, and scantling; 260,399 feet of timber; 172,500 shingles; 142,234 hhd. staves, &c. Among the articles passing to the north on the canal, are between three and four tons of Congress spring water.

The commissioners consider it their duty, before they conclude their report, to submit some suggestions to the legislature, which may be deemed worthy of attention.

It is, no doubt, proper that appeals should lie from

the decisions of the appraisers, authorised to assess damages consequent on the operations of the canals; but, the authority appointed for that purpose ought to be enabled to administer relief, not only promptly and impartially, but with a full knowledge of the subject, and with as little expense as possible. The supreme court is the present tribunal for hearing appeals, but it can only set aside assessments, without rectifying them; and, of course, the appraisers are again called on to act, and unnecessary delay and expense are produced. Besides, in most cases, it is not possible to make a judicious determination, without a view of the premises for which damages are claimed. The establishment of a board for hearing appeals, and deciding finally on them, would therefore be attended with beneficial results; and a provision might be adopted which would effectually prevent frivolous appeals, by rendering an appellant, if unsuccessful, liable for the expenses.

By the present laws, boats may pass on the canals at the rate of five miles an hour. As this is attended with damage to the banks, by the violent agitation of the waters, the speed of boats ought to be restrained to four miles an hour.

The water power, which is formed by the canals, and which is often more than sufficient for navigable purposes, might be usefully employed for hydraulic establishments, and also rendered productive of considerable revenue. There is no authority to sell rights of this description; and, when conferred, it ought to be confined to limited periods.

The materials, which are provided by the con-

tractors, and sometimes on monies advanced by the board, are liable to be sold on execution, to the detriment of our operations. An exemption in such case, would relieve us from great procrastination, without implicating essentially the just rights of creditors.

The absolute necessity of providing ample accommodations for boats at the places of the commencement and termination of the canals, and at proper intervening positions, must be obvious: and as there is no express authority given for this purpose, the subject is respectfully recommended to your favorable consideration.

And while the commissioners tender their cordial congratulations on the prospect of a speedy and successful accomplishment of this great work, they cannot refrain from the expression of their full persuasion, that the legislature will promptly afford all the aid in their power; for the sooner it is completed, the more extended will be the general accommodation—the more productive the revenue—the greater the honor—and the more impressive the example.

DE WITT CLINTON,
STEPHEN VAN RENSSELAER,
SAMUEL YOUNG,
MYRON HOLLEY,
HENRY SEYMOUR,
WILLIAM C. BOUCK.

Albany, February 27, 1822.